Safety instructions

HAWK SULTAN SERIES

Smart Universal Level Transmitter And Network

Manufactured by: Hawk Measurement Systems Pty Ltd,
15-17 Maurice Court,
Nunawading, Vic.
Australia. 3131

1. General

The Hawk Sultan Series Acoustic Wave equipment uses high frequency acoustic waves to measure the distance from the sensor face to the material product surface. The equipment is available as an Integral Transmitter or as a Remote system, with an Ex or non-Ex rating.

The AWI series Sultan Acoustic Wave Integral Transmitter models, as well as the AWS series Sultan Smart Transducer models consist of a transducer and an electronic control amplifier in a single housing. They are mounted directly at the level measurement point – usually at the top of a vessel and focused downwards to the product surface. The Integral Transmitter includes a user interface keypad and display, whereas the Smart Transducer is smaller in size and has no user interface except for the communication port.

The Remote Sultan system is one where an AWRT series Sultan Acoustic Wave Remote Transducer is mounted at the level measurement point, and an AWR series Sultan Remote Electronics unit is installed some distance away, in a more convenient location.

The ST Series Sonar transducers are similar to the AWRT series Sultan Acoustic Wave Remote Transducers. They are normally installed submerged in a liquid or slurry rather than in an air medium.

The TE Series and TD Series transducers are alternatives to the AWRT series Sultan Remote Transducer models. Consult the factory or local distributor for application and interface details on these.

2. Category 1 / 2 Equipment Identification

If Hawk Sultan Acoustic Wave equipment is installed and mounted in Category 1 or 2 hazardous areas, these User Manual Safety and Operating Instructions, the general Ex installation regulations and the general installation regulations for electrical equipment must all be observed. The installation of Ex instruments should only be made by trained personnel.

a) **Intrinsic Safe (Ex ia) rated Equipment for Category 1 Gas and Dust areas (Zone 0)**

Sultan AWR, AWI, and AWRT series equipment models having an Ex ia rating can be identified from information on the additional marking label according to ATEX Type Examination Certificate number ITS04ATEX22807.

II 1 GD EEx ia IIA T4 IP67 (T_{amb} = -20ºC to 70ºC)

To be compliant, the equipment must be installed with Intrinsic Barrier devices as described in Intrinsic Safe Installation. Cables from both hazardous and safe areas must be segregated from each other according to the appropriate Intrinsic Safe installation standards. Sonar transducers are rated and marked IP68 for up to 1 metre submersion depth.

b) **DIP rated Equipment for Category 1 / 2 Dust areas (Zone 20 / 21)**

Sultan AWR, AWI, AWRT, AWST, ST, TE and TD series equipment models having a Dust Ingress Protection rating can be identified from information on the additional marking label according to ATEX Type Examination Certificate number ITS04ATEX12896X.

II 1 D T85ºC IP67 T_{amb} = -20ºC to 75ºC

To be compliant, the equipment must be installed with suitable protection for the cable. It must be protected in a suitable manner and terminated in an enclosure suitable for the environment, such as a suitably certified EEx e junction box.

c) **Encapsulated (Ex m) rated Equipment for Category 2 Gas and Dust areas (Zone 1, 21)**

Sultan AWRT, AWST, ST, TE and TD series equipment models with an Ex m rating can be identified from information on the additional marking label according to ATEX Type Examination Certificate number ITS04ATEX82808X.

II 2 GD EEx m II IP68 T6 (T_{amb} = -20ºC to 50ºC) T5 (T_{amb} = -20ºC to 65ºC)

To be compliant, the equipment must be installed with suitable protection for the cable. It must be protected in a suitable manner and terminated in an enclosure suitable for the environment, such as a suitably certified EEx e junction box.

d) **Non Ex rated Equipment for safe areas:**

Sultan equipment without Ex rating can be identified by the fact that only the standard Hawk part number / serial number marking label has been applied. This equipment must only be installed in a safe area. Cables must be protected in a suitable manner and terminated in an enclosure suitable for the environment. Refer also to temperature range in Specifications.

3. Putting Into Service

To put a Hawk Sultan Unit safely into service, the following steps must be taken:

a) Correct installation. Follow the instructions in Typical Installations and Installation Guide.

b) Remote Electronics enclosure conduit entry locations for AWR series models are shown in Dimensions – Remote Enclosure. Remove the terminal cover by loosening the two captive screws. Use a flat blade screwdriver and a slight tap to remove the selected conduit entry openings in the front of the enclosure. Follow the installation instructions in the Installation Guide and Wiring Diagram sections. Be careful to seal any unused cable glands. When wiring is complete, ensure the cable glands are securely sealed against the enclosure and the cable, then seal the terminal cover by tightening the two screws.

c) Integral Transmitter AWI series models have cable glands located at the rear of the housing which face downward to protect against moisture ingress. Ensure that cable glands are securely tightened to adequately seal the cable. Be careful to seal any unused cable glands. The Smart Transducer model AWST has one cable entry point.

d) Correct wiring. Follow the instructions in the Wiring Diagram sections. Wiring should be in accordance with relevant installation standards for hazardous area equipment or other local codes of practice.

e) Safe temperature. Temperature must not exceed the operating range of the Sultan unit. In particular, Ex rated equipment must not exceed the temperature limits stated in Category 1 / 2 Equipment Identification, above.

f) Safe power supply. Power supply values must be according to the Specifications.

g) It is advised to provide a cover for the unit to prevent damage that could happen due to environmental conditions.

h) Do not put into service where there is a possibility of contact with acetic acid.

4. Use

The instructions for safe use of the Sultan Unit is as follows:

a) The Sultan equipment must put into service safely. (see Putting Into Service, above).

b) This User Manual must be read and understood by any person involved with the unit.

c) Environment and installation conditions should be checked regularly.

d) When opening the cover of the any Sultan unit, prevent dust, liquids or chemical substances from getting inside the unit. Do not leave any cover open in rain or snow conditions.

e) The LCD display is visible through the clear lid of the AWR series Sultan Remote Electronics enclosure. To view the LCD display on the AWI series Sultan Integral Transmitter, open the visor by lifting up the front edge with a finger. Close and click into place again after viewing so that the display is protected from environmental effects.

f) Before making any wiring or hardware configuration changes, it is important to disconnect power from the equipment.

5. Assembling and dismantling

The only assembly that may be required by the user is to reconfigure a Sultan '234' unit (2,3,4 wire operation) to that of a Sultan '2' unit (2 wire operation). This flexibility is unique to Sultan equipment.

To safely reconfigure a Sultan '234' model to that of a Sultan '2' model:

a) Make sure that the original unit is a Sultan '234' model (eg, AWI234 or AWR234). It is not possible to reconfigure a Sultan '2' model (eg, AWI2 or AWR2) as a Sultan 234 model. Only Sultan '234' models can be reconfigured to operate as Sultan '2' models, and this modification is reversible.

b) Disconnect the power to the Sultan '234' Unit.

c) To do the modification, follow the instructions in Wiring – Change Sultan 234 <=> Sultan 2.

d) Modify the wiring to suit the new output configuration as shown in Wiring Diagrams.

6. Installation and Wiring

Carefully follow Typical Installations, Installation Guide and Wiring Diagram sections. Follow all points listed in Putting Into Service, above. Wiring should be in accordance with relevant installation standards for hazardous area equipment or other local codes of practice.

7. Adjustment

a) Sultan Integral AWI series models:

To access the user controls, loosen the single captive screw sufficiently to release the lid. The lid can then be raised to one of two positions – 1) vertical, 2) swung right back [hinge unlocks] to gain access to the cable wiring located under the interior hinged cover flap. To close the lid, ensure that the double hinge at the top of the enclosure is locked into place before re-tightening the lid fastening screw.

b) Sultan Remote Electronics AWR series models:

To access the user controls, unlock the clear cover using the lever on the right hand side of the clear lid. Press this lever in the direction of the arrow (towards the lid) to release the catch. The lid can then be swung open to gain access to the user control push buttons. Close the lid when finished. To lock the lid, press on the lower part of the lever, which moves the arrow symbol (in reverse) slightly away from the lid, locking the lid closed.

c) **Change of output configuration:**

The only other hardware adjustment that may be desired by the user is converting from the Sultan '234' output configuration to the Sultan '2' output configuration. Refer to Assembling and Dismantling, above.

d) **Software Adjustment:**

For software adjustment of Sultan unit parameter adjustment and data entry, refer to instructions in Entering Data, and all of the Setup sections. If *GosHawk II* software is to be used for parameter adjustment and data entering from a lap-top computer, read and fully understand the information in the *GosHawk II Manual* either supplied with the equipment or downloaded free from the Hawk web-site: http://www.hawklevel.com The AWST series models (with no buttons) can only be adjusted in this way.

8. Application Conditions

a) **Voltage Supply:**

Must be according to the voltage supplies given in Specifications.

b) **Temperature:**

Must not exceed the operating temperature range stated in Putting Into Service, above. To prevent inaccuracies due to extremes in temperature and the effect of long term UV exposure, it is recommended that transducers constructed with grey/beige polypropylene housing material be protected from direct sunlight. This does not apply to the blue/green and dark grey plastic enclosure parts. These parts have better UV stability.

c) **Cable Connection:**

Cables must only be replaced by the same cable type. If extending the cable, it must be protected in a junction box and terminated in an enclosure suitable for the environment. Refer to Wiring Diagrams – Transducer.

d) **Earthing:**

Hawk Sultan Acoustic Wave equipment must be earthed to ensure that shielded cabling is effective.

e) **Electrostatic Discharge:**

Hawk Sultan Acoustic Wave equipment has been certified safe to use in hazardous dust locations. Marking labels for Ex ia and Ex m equipment warn not to rub the surface with a dry cloth if equipment is installed in hazardous gas locations.

f) **Industrial Conditions:**

This equipment is designed for use in normal industrial conditions relating to humidity, vibration, etc. If the user intends to operate the equipment in more severe environmental conditions, the manufacturer or local distributor should be consulted for advice.

9. List of equipment types:

		Approvals
Sultan Acoustic Wave Remote Electronics	– AWR series	I,D
Sultan Acoustic Wave Remote Sonar Electronics	– AWR Sonar Series	I,D
Sultan Acoustic Wave Remote Position Electronics	– AWR Position Series	I,D
Sultan Acoustic Wave Remote Transducer	– AWRT series	I,D,M
Sultan Acoustic Wave Remote Sonar Transducer	– AWRT Sonar Series	I,D,M
Sultan Acoustic Wave Integral Transmitter	– AWI series	I,D
Sultan Acoustic Wave Integral Sonar Transmitter	– AWI Sonar Series	I,D
Sultan Acoustic Wave Integral Position Transmitter	– AWI Position Series	I,D
Sultan Acoustic Wave Smart Transducer	– AWST series	D,M
Sultan Acoustic Wave Smart Position Transducer	– AWST Position Series	D,M
Sultan Acoustic Wave Smart Sonar Transducer	– AWST Sonar Series	D,M
TE Series Transducer		D,M
TD Series Transducer		D,M
ST Series Transducer		D,M
Flange Selection		I,D,M
Cone Selection		I,D,M
Extras		I,D,M

Approval codes: I = Ex ia, D = DIP, M = Ex m.

10. Intrinsic Safe Input / Output Parameters, IS barrier types.

Note: All equipment in Zone 0 Hazardous area must have ATEX Cat 1 marking.

A. 2-wire Integral Transmitter in Zone 0 Hazardous area.

I.S. Barrier(s) connected between Transmitter and control system.

Current Loop Input:

Ui = 28 Volts
Ii = 93 mA
Pi = 0.66 W
Ci = 0
Li = 0

Barrier Eg, MTL 7787+

Optional Communication to PLC/DCS:

Ui = 9 Volts
Ii = 120 mA
Pi = 0.54 W
Ci = 0
Li = 0
Uo = 5.9 Volts
Io = 1.13 Amps
Po = 0.66 W
Co = 1000 µF
Lo = 223 µH
L/R Ratio = 170 µH/Ω

Barrier Eg, MTL 7758+

B. 2-wire Remote Amplifier in Zone 0 Hazardous area and Transducer in Zone 0 Hazardous area.

I.S. Barrier(s) connected between Amplifier and control system.

Current Loop Input:

Ui = 28 Volts
Ii = 93 mA
Pi = 0.66 W
Li = 0
Ci = 0

Barrier Eg, MTL 7787+

Optional Communication to PLC/DCS:

Ui = 9 Volts
Ii = 120 mA
Pi = 0.54 W
Ci = 0
Li = 0
Uo = 5.9 Volts
Io = 1.13 Amps
Po = 0.66 W
Co = 1000 µF
Lo = 223 µH
L/R Ratio = 170 µH/Ω

Barrier Eg, MTL 7758+

C. 2-wire Remote Amplifier in Safe area and Transducer in Zone 0 Hazardous area.

I.S. Barriers connected between Transducer and Amplifier.

Transducer Power: from Remote Amplifier

Uo = 12.6 Volts
Io = 2.41 Amps
Po = 1.2 W
Co = 13.5 µF
Lo = 25 µH
L/R Ratio = 37.5 µH/Ω

Barrier Eg, MTL 7766Pac

Essential Communication to Transducer:

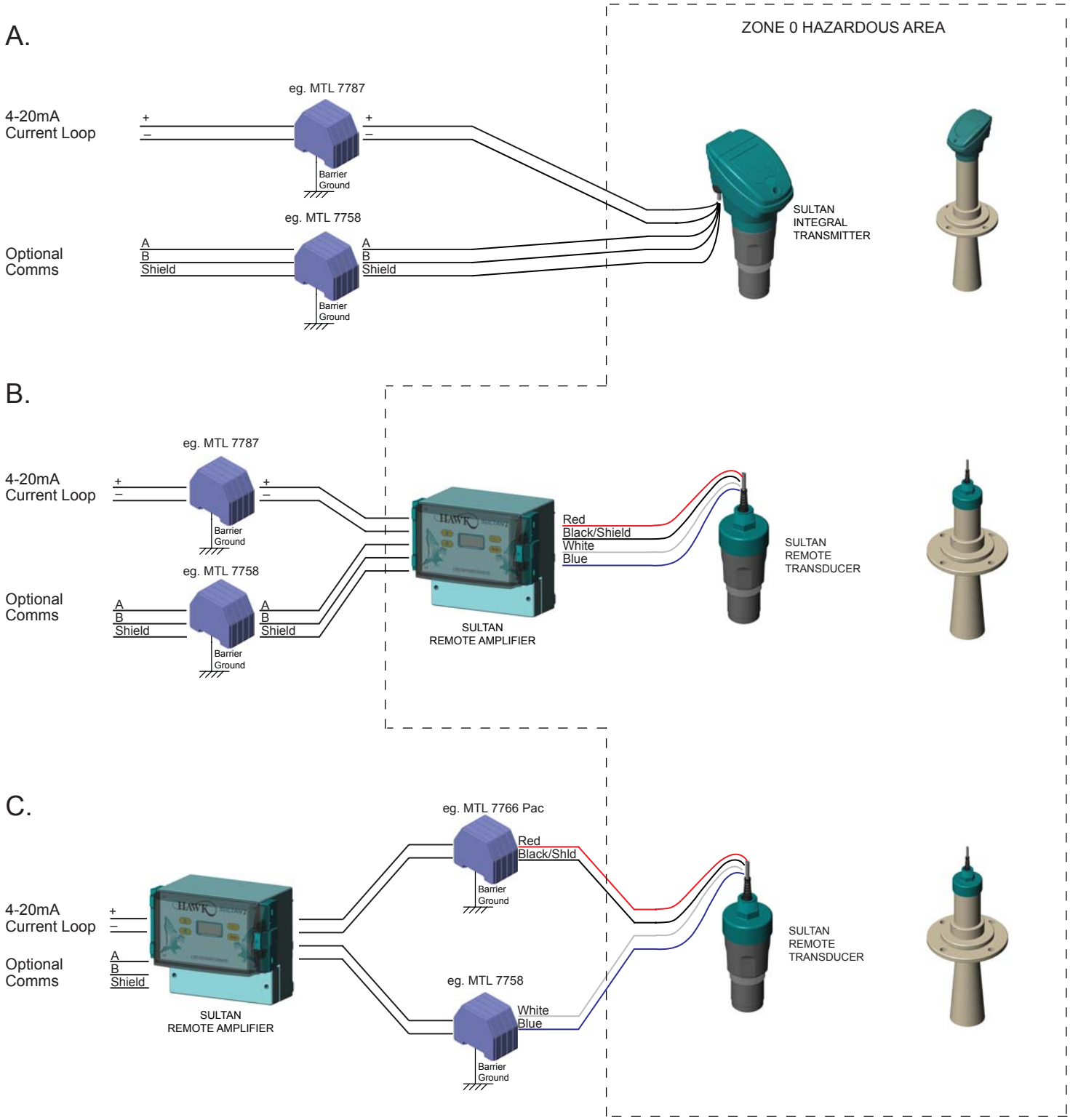
Ui = 9 Volts
Ii = 120 mA
Pi = 0.54 W
Ci = 0
Li = 0
Uo = 5.9 Volts
Io = 1.13 Amps
Po = 0.66 W
Co = 1000 µF
Lo = 223 µH
L/R Ratio = 170 µH/Ω

Barrier Eg, MTL 7758+

See wiring diagrams ‘A’, ‘B’ and ‘C’ respectively for more details.

2-Wire Loop Configurations

A.



B.

C.

Related Drawing
No modifications permitted without the approval of the Engineering Manager

DOC NO: 892		NOT TO SCALE	ALL DIMENSIONS IN MM
COMPANY:		HAWK MEASUREMENT SYSTEMS 15-17 MAURICE COURT, NUNAWADING, VICTORIA, AUSTRALIA 3131	
DRAWN: RL	DATE 14/02/06		
CHECKED:	DATE		
APRVD:	DATE		
REF.		TITLE: Sultan Intrinsic Safe Wiring	A4
		DWG NO. HAW_D_SUL-WIR-IS	REVISION A01 / SHEET 1-3

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Intrinsic Safe Input / Output Parameters, IS barrier types (cont.)

Note: All equipment in Zone 0 Hazardous area must have ATEX Cat 1 marking

G. Low Power Multiple Integral Transmitter configuration within a Zone 0 Hazardous area.

I.S. Barriers connected between the group of Integral Transmitters and the control system.

Power Supply Input:

Ui = 28 Volts
Ii = 93 mA
Pi = 0.66 W
Ci = 0
Li = 0

Barrier Eg, MTL 7787+

Essential Multi-drop Communication to PLC/DCS:

Ui = 9 Volts
Ii = 120 mA
Pi = 0.54 W
Ci = 0
Li = 0
Uo = 5.9 Volts
Io = 1.13 Amps
Po = 0.66 W
Co = 1000 µF
Lo = 223 µH
L/R Ratio = 170 µH/Ω

Barrier Eg, MTL 7758+

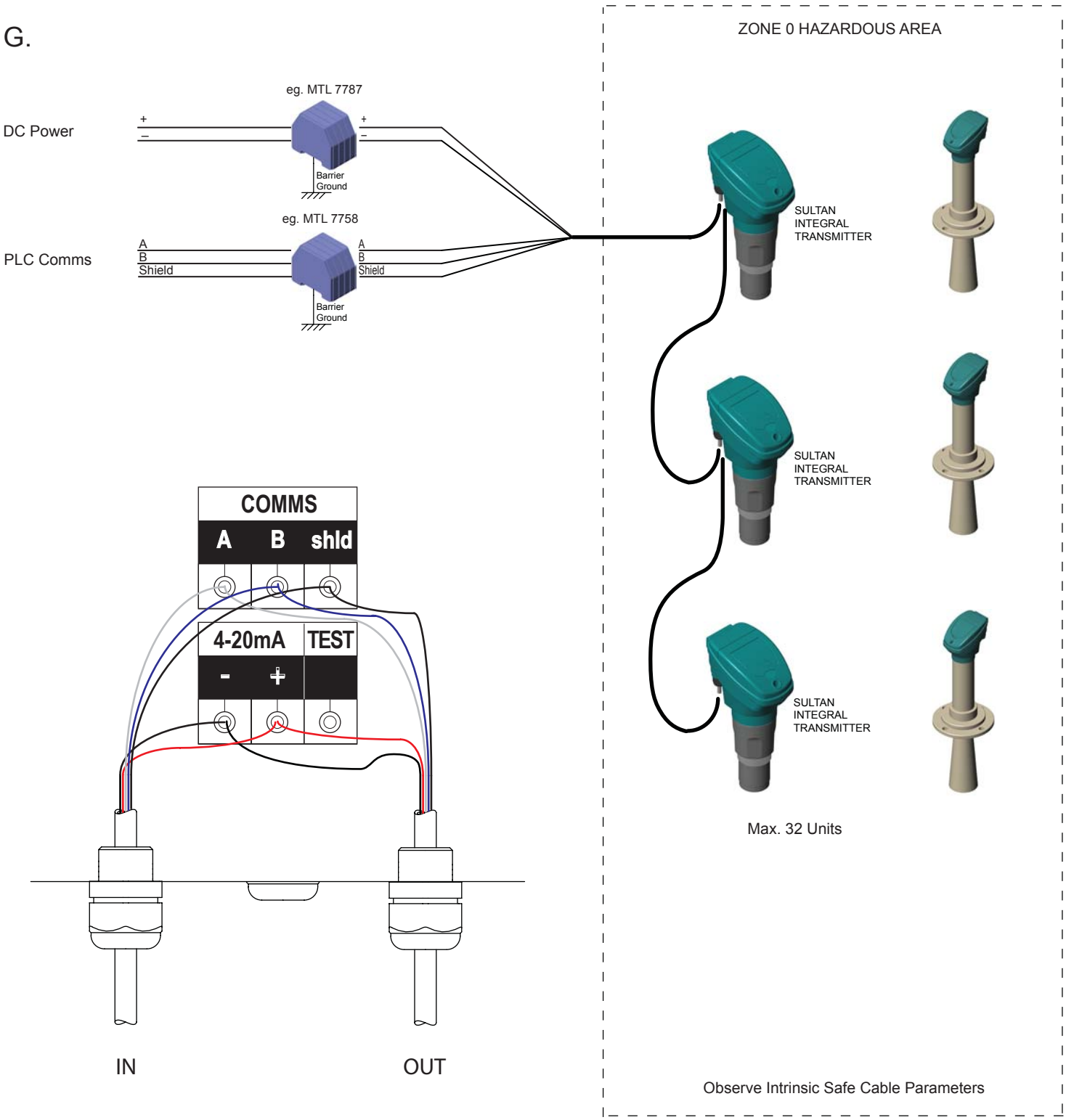
See wiring diagram 'G' for more details.

Note:

Total cable Inductance / Resistance parameters must be within the above specifications.
A single I.S. barrier of both types will protect the daisy-chained group of Integral Transmitters.
Current consumption for each 'low power' unit = 2mA approx.

Low Power Multidrop Comms Configurations

G.



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